ECON 3010
Intermediate Macroeconomics

Chapter 2
The Data of Macroeconomics

IN THIS CHAPTER, YOU WILL LEARN:

…the meaning and measurement of the most important macroeconomic statistics:

- gross domestic product (GDP)
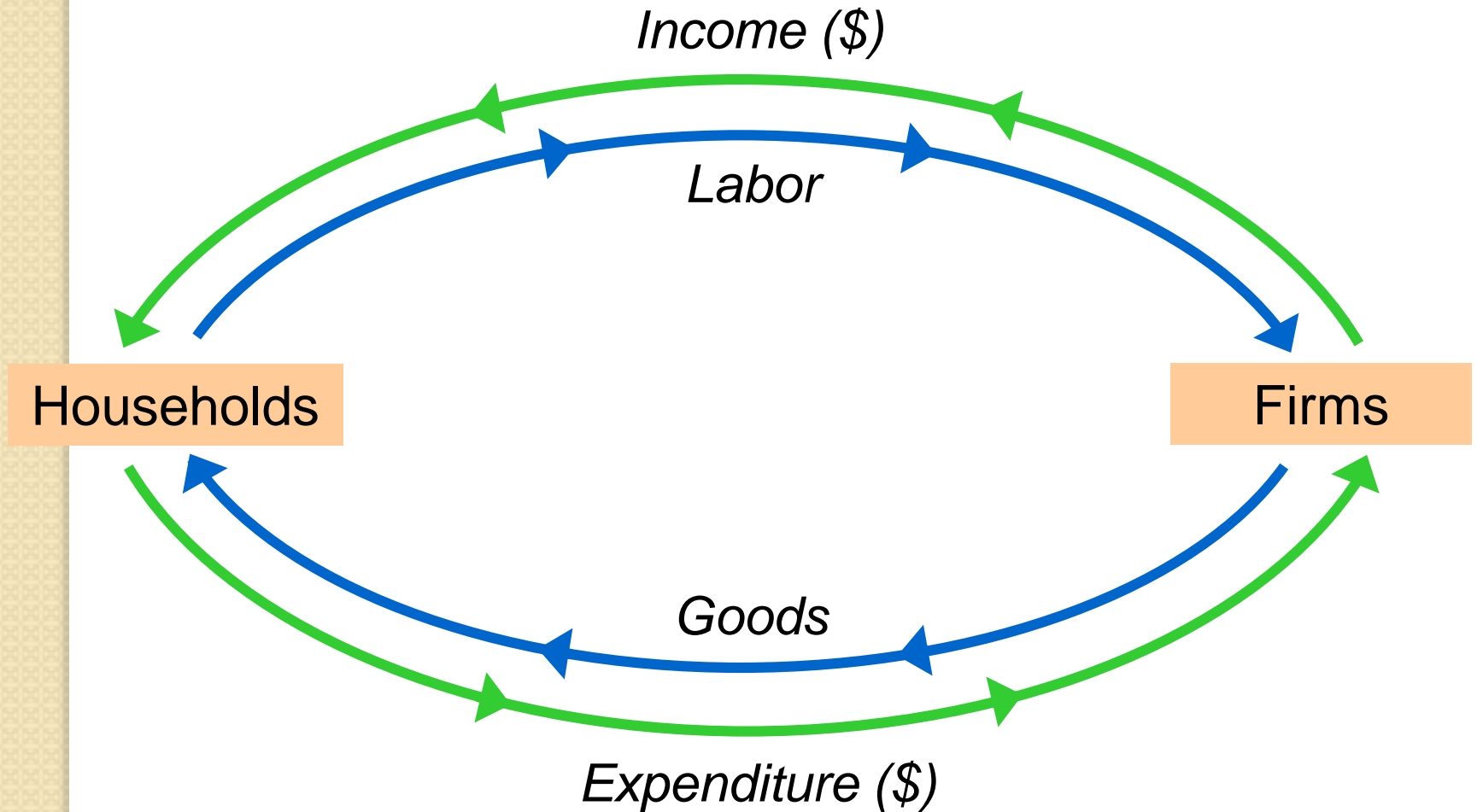- the consumer price index (CPI)
- the unemployment rate

Gross Domestic Product: Expenditure and Income

Two definitions:

- Total expenditure on domestically-produced final goods and services.

- Total income earned by domestically-located factors of production.

Expenditure equals income because every dollar a buyer spends becomes income to the seller.

The Circular Flow

The expenditure components of GDP

- consumption, *C*

- investment, *I*

- government spending, *G*

- net exports, *NX*

An important identity:

$$Y \; = \; C \; + \; I \; + \; G \; + \; NX$$

*value of
total output*

*aggregate
expenditure*

Consumption (C)

definition: The value of all goods and services bought by households. Includes:

- *durable goods* last a long time e.g., cars, home appliances
- *nondurable goods* last a short time e.g., food, clothing
- *services* intangible items purchased by consumers e.g., dry cleaning, air travel

U.S. consumption, 2011

	$ billions	*% of GDP*
Consumption	10,726	71.1
Durables	1,163	7.7
Nondurables	2,484	16.5
Services	7,079	46.9

Investment (I)

- Spending on capital, a physical asset used in future production

- Includes:

  ○ *Business fixed investment*
    Spending on plant and equipment

  ○ *Residential fixed investment*
    Spending by consumers on housing

  ○ *Inventory investment*
    The change in the value of all firms' inventories
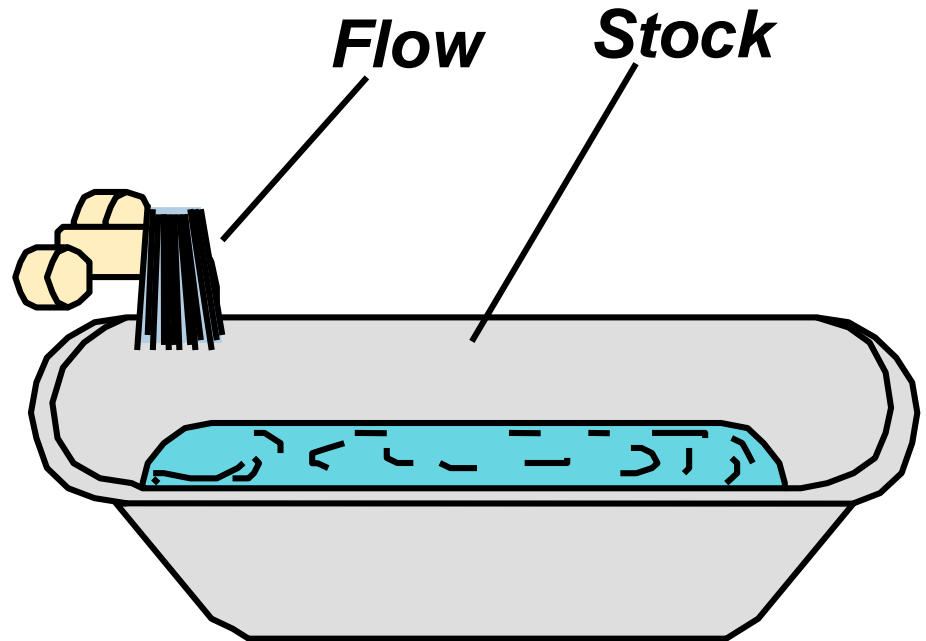
U.S. Investment, 2011

	$ billions	% of GDP
Investment	1,916	12.7
Business fixed	1,532	10.2
Residential	338	2.2
Inventory	46	0.3

Stocks vs. Flows

A **stock** is a quantity measured at a point in time (e.g., capital stock).

A **flow** is a quantity measured per unit of time (e.g., investment).

Flow   *Stock*

Stocks vs. Flows - examples

stock	flow
a person's wealth	a person's annual saving
# of people with college degrees	# of new college graduates this year
the govt debt	the govt budget deficit

Government spending (G)

- **G** includes all government spending on goods and services.

- **G** excludes transfer payments (e.g., unemployment insurance payments), because they do not represent spending on goods and services.

U.S. Government Spending, 2011

	$ billions	% of GDP
Govt spending	3,031	20.1
- Federal	1,233	8.2
Non-defense	408	2.7
Defense	825	5.5
- State & local	1,798	11.9

Net exports (NX)

- **NX** = exports – imports
  - **exports**: the value of goods and services sold to other countries
  - **imports**: the value of goods and services purchased from other countries

- Hence, NX equals net spending from abroad on our goods and services

U.S. Net Exports, 2011

	$ billions	% of GDP
Net Exports	–579	–3.8
Exports	2,086	13.8
Goods	1,473	9.8
Services	612	4.1
Imports	2,664	17.7
Goods	2,238	14.8
Services	426	2.8

Why output = expenditure?

- Unsold output goes into inventory, and is counted as "inventory investment".

- In effect, we are assuming that firms purchase their unsold output.

GDP: An important concept

GDP measures:

○ total income

○ total output

○ total expenditure

○ the sum of value added at all stages in the production of final goods

Real vs. nominal GDP

- GDP is the *value* of all final goods and services produced.
- **Nominal GDP** measures these values using current prices.
- **Real GDP** measure these values using the prices of a base year.

Real and Nominal GDP

	2010		2011		2012	
	P	Q	P	Q	P	Q
good A	$30	900	$31	1,000	$36	1,050
good B	$100	192	$102	200	$100	205

- Compute nominal GDP in each year.

- Compute real GDP in each year using 2010 as the base year.

Answers

nominal GDP *multiply Ps & Qs from same year*

2010: $46,200 = $30 × 900 + $100 × 192

2011: $51,400

2012: $58,300

real GDP   *multiply each year's Qs by 2010 Ps*

2010: $46,200
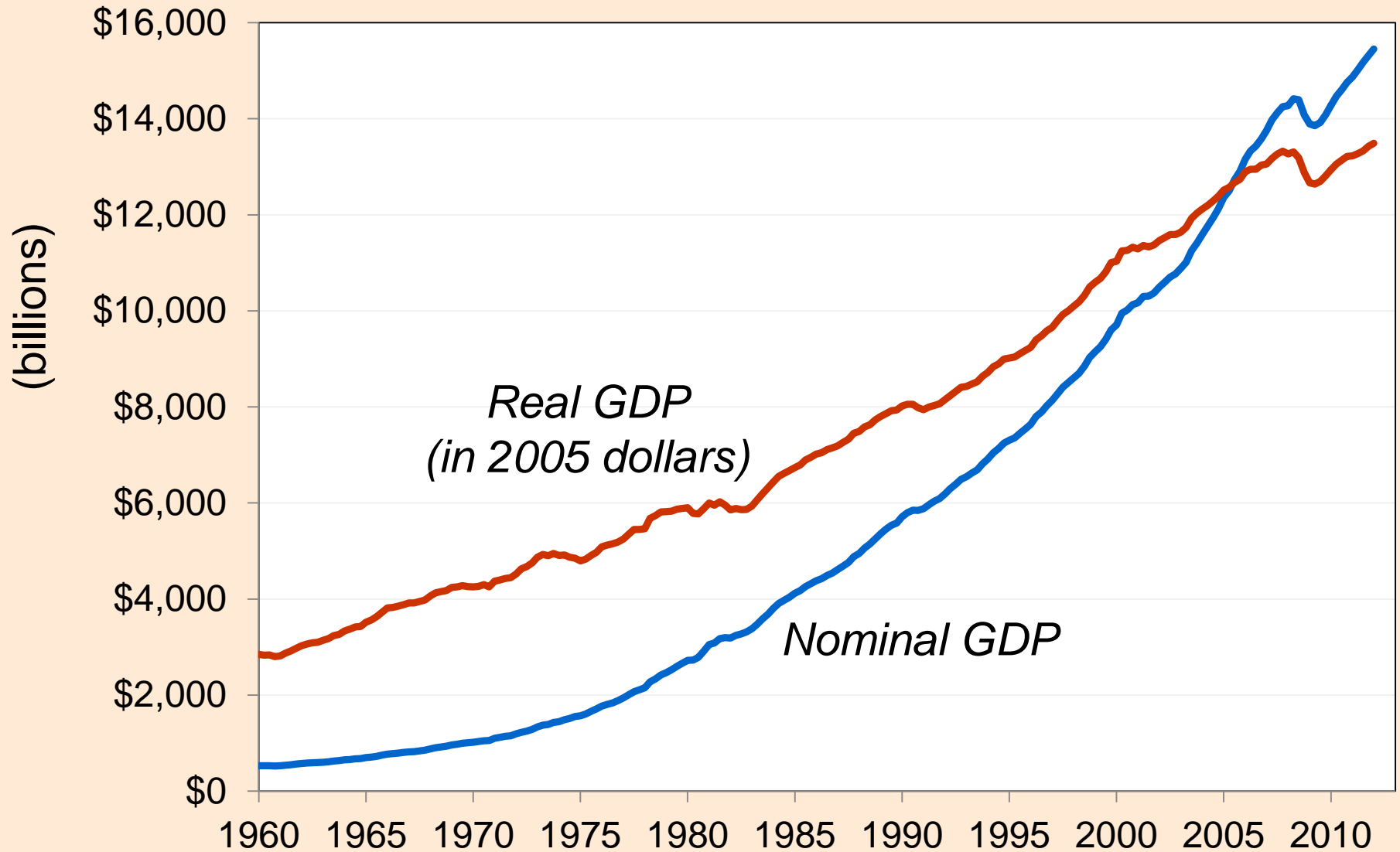
2011: $50,000

2012: $52,000 = $30 × 1050 + $100 × 205

Real GDP controls for inflation

- Changes in nominal GDP can be due to:
  - changes in prices
  - changes in quantities of output produced

- Changes in real GDP can only be due to changes in quantities, because real GDP is constructed using constant base-year prices.

U.S. Nominal and Real GDP, 1960-2012

Real GDP (in 2005 dollars)

Nominal GDP

GDP Deflator

- **Inflation rate**: the percentage increase in the overall level of prices
- One measure of the price level: **GDP deflator**

Definition:

$$\text{GDP deflator} = 100 \times \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

GDP deflator and inflation rate

	Nom. GDP	Real GDP	GDP deflator	Inflation rate
2010	$46,200	$46,200		*n.a.*
2011	51,400	50,000		
2012	58,300	52,000		

- Use your previous answers to compute the GDP deflator in each year.

- Use GDP deflator to compute the inflation rate from 2010 to 2011, and from 2011 to 2012.

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Answers

	Nom. GDP	Real GDP	GDP deflator	Inflation rate
2010	$46,200	$46,200	100.0	*n.a.*
2011	51,400	50,000	102.8	2.8%
2012	58,300	52,000	112.1	9.1%

- Use your previous answers to compute the GDP deflator in each year.

- Use GDP deflator to compute the inflation rate from 2010 to 2011, and from 2011 to 2012.

Chain-Weighted Real GDP

- Over time, relative prices change, so the base year should be updated periodically.

- The **chain-weighted real GDP** updates the base year every year, so it is more accurate than constant-price GDP.

Consumer Price Index (CPI)

- A measure of the overall level of prices
- Published by the Bureau of Labor Statistics (BLS)
- Uses:
    - tracks changes in the typical household's cost of living
    - adjusts many contracts for inflation ("COLAs")
    - allows comparisons of dollar amounts over time

How the BLS constructs the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods

2. Every month, collect data on prices of all items in the basket; compute cost of basket

3. CPI in any month equals …

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

Compute the CPI

Basket: 20 pizzas, 10 compact discs

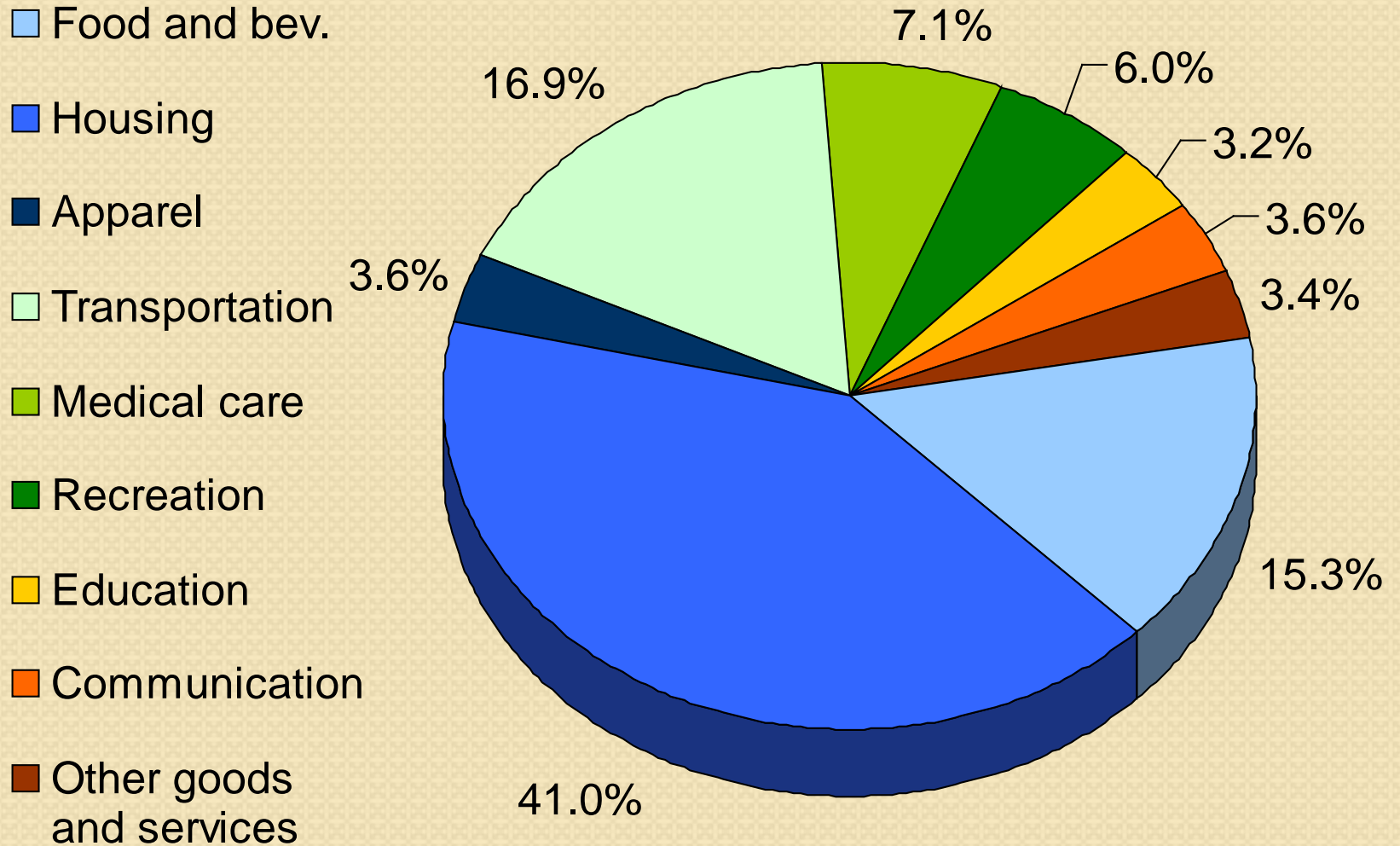| prices:		
	pizza	CDs
2012	$10	$15
2013	11	15
2014	12	16
2015	13	15

For each year, compute

- the cost of the basket
- the CPI (use 2012 as the base year)
- the inflation rate from the preceding year

Answers

	Cost of basket	CPI	Inflation rate
2012	$350	100.0	*n.a.*
2013	370	105.7	5.7%
2014	400	114.3	8.1%
2015	410	117.1	2.5%

The composition of the CPI's "basket"

Legend:
- Food and bev.
- Housing
- Apparel
- Transportation
- Medical care
- Recreation
- Education
- Communication
- Other goods and services

7.1%
6.0%
3.2%
3.6%
3.4%
16.9%
3.6%
15.3%
41.0%

Why the CPI may overstate inflation

- **Substitution bias**:
  The CPI uses fixed weights, so it cannot reflect consumers' ability to substitute toward goods whose relative prices have fallen.

- **Introduction of new goods**:
  The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI, because the CPI uses fixed weights.

- **Unmeasured changes in quality**:
  Quality improvements increase the value of the dollar but are often not fully measured.

The size of the CPI's bias

- In 1995, a Senate-appointed panel of experts estimated that the CPI overstates inflation by about 1.1% per year.
- So the BLS made adjustments to reduce the bias.
- Now, the CPI's bias is probably under 1% per year.

CPI vs. GDP Deflator

Prices of capital goods:

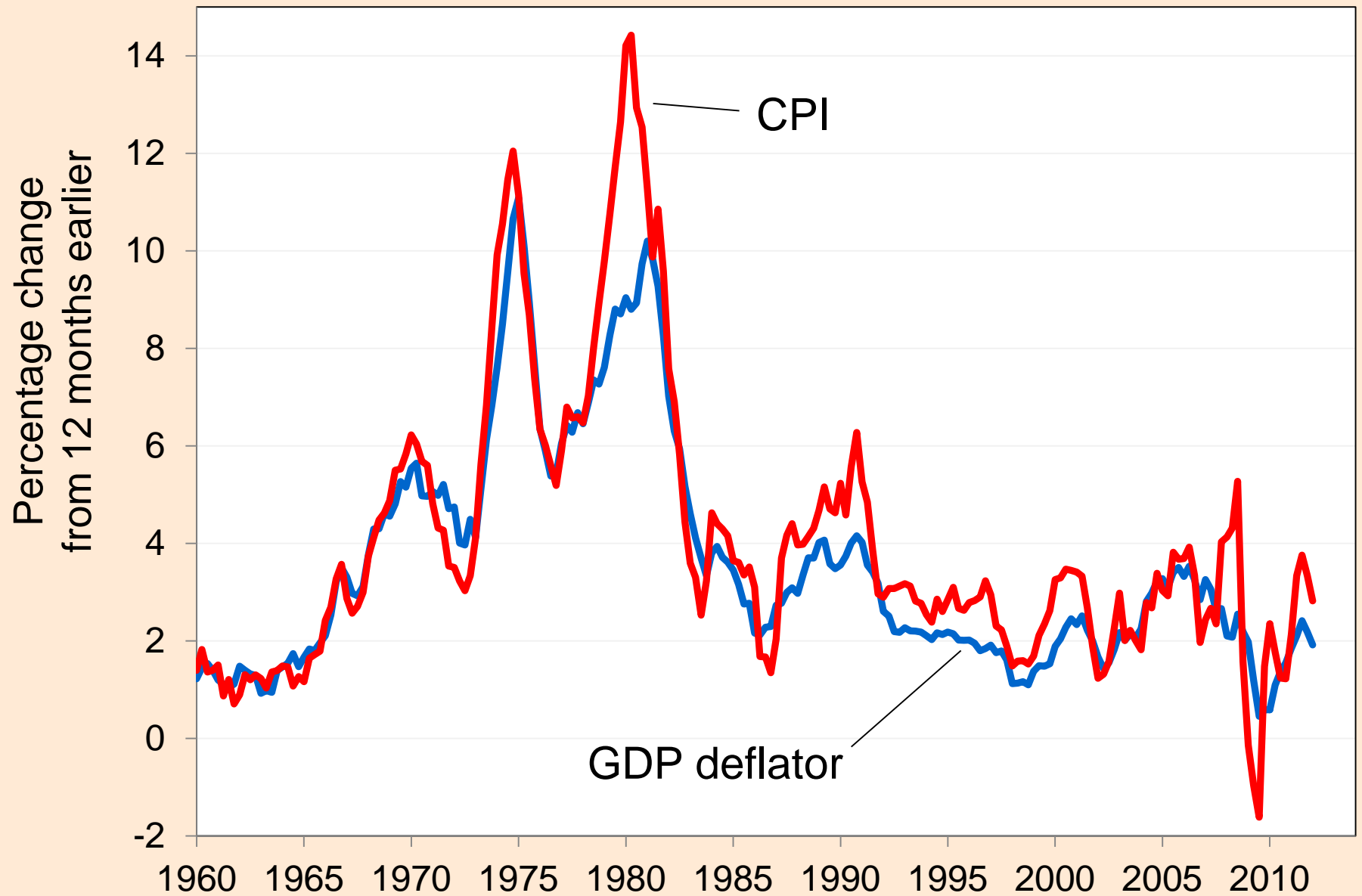- included in GDP deflator (if produced domestically)
- excluded from CPI

Prices of imported consumer goods:

- included in CPI
- excluded from GDP deflator

The basket of goods:

- CPI: fixed
- GDP deflator: changes every year

Two measures of inflation in the U.S.

Categories of the population

- **employed**
  working at a paid job
- **unemployed**
  not employed but looking for a job
- **labor force**
  the amount of labor available for producing goods and services; all employed plus unemployed persons
- **not in the labor force**
  not employed, not looking for work

Two important labor force concepts

- **unemployment rate**
  percentage of the labor force that is unemployed

- **labor force participation rate**
  the fraction of the adult population that "participates" in the labor force, *i.e.* is working or looking for work

Computing labor statistics

U.S. adult population by group, May 2012

Number employed   =   142.3 million

Number unemployed   =   12.7 million

Adult population   =   243.0 million

Use the above data to calculate
- the labor force
- the number of people not in the labor force
- the labor force participation rate
- the unemployment rate

Answers

data: E = 142.3, U = 12.7, POP = 243.0

- labor force
  L = E + U = 142.3 + 12.7 = <u>155.0</u>

- not in labor force
  $NILF$ = POP − L = 243 − 155 = <u>88</u>

- unemployment rate
  U/L x 100% = (12.7/155.0) x 100% = <u>8.2%</u>

- labor force participation rate
  L/POP x 100% = (155/243) x 100% = <u>63.8%</u>